



OFFICE MEMORANDUM

DATE: August 6, 1997

TO: District Engineer
District Field Engineers
District Materials Engineers
District Materials Supervisors
District Construction Engineers
Resident/Project Engineers/TSC Managers

FROM: Gary D. Taylor
Chief Engineer/Deputy Director
Bureau of Highway Technical Services

**SUBJECT: CONSTRUCTION AND TECHNOLOGY CIRCULAR LETTER 1997-1
Superpave Performance Grading System**

INTRODUCTION

On January 1, 1997, MDOT implemented the Superpave Performance Grading System for all asphalt binders. The old penetration and viscosity grading systems were totally abandoned so suppliers of the asphalt binder would only have to produce under one grading system. This appeared to be a rather painless transition from a materials point of view. The transition has become more complicated due to the carryover of the 1990 construction projects and the introduction of the 1996 spec book. Projects that are governed by the 1990 spec book will continue to surface, possibly for the next several years. This document is intended to provide a guideline to help clarify or solve any issue that MDOT personnel, material suppliers, and contractors may have during this awkward transition period.

Several of you may have received memos, meeting minutes, etc. that have attempted to clarify these scenarios. Upon receiving this memo, please consider the slate clean and refer to this document as the official guide.

Recently there have been meetings between MDOT personnel and industry representatives regarding two problems that have developed during the first couple months of using the performance grade binders. The first problem is that the binders, selected for the different regions, have a softer consistency than was originally anticipated. The second problem is that due to the softer consistency, the recovered penetration requirements need to be adjusted.

The solution to these problems was to establish new recovered penetration requirements that better fit the binder grades, and also to introduce the following philosophy:

PG 52-28 will be the specified binder grade for the Upper Peninsula

PG 58-28 will be the specified binder grade for the Lower Peninsula

These solutions require new binder usage guidelines and special provisions that reflect these changes for use in projects that are not yet under contract. Work orders will be required for these changes to take place in projects that are already under contract.

There are three different special provision combinations that may be found in proposals. These three combinations will be considered Cases 1 through 3 as shown on the Binder Requirement Table found on page three of this document. Each case is further subdivided into situations where RAP is not used and situations in which RAP is used.

At the end of the discussions of Cases 1 through 3, there will be a section titled "Solutions". These solution sections will describe what work orders need to be prepared in order to solve the problems described above.

The information in this document does not apply to Superpave projects.

CONCLUSION

We appreciate your help and patience while going through this transition period. Questions regarding this document can be directed to John Barak at 517-322-1215 of the Bituminous Unit.

Chief Engineer/Deputy Director

JDC:JWB:dg

Attachments

SUBJECT INDEX: Materials

cc: Lansing C&T Staff Engineers
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BINDER REQUIREMENTS

	<div>S p e c . B o o k</div>	<div>Special Provisions In Proposal</div>	<div>RAP</div>	<div>Original Requirements</div>	<div>Recovered Requirements</div>
<div>C A S E # 1 (1)</div>	1990	#2	no	Any certified PG binder can be used.	45-95 dmm for 85-100
	Solution: A work order must be prepared using Special Provision #1 (page 7). This will allow any PG binder to be substituted for the penetration or viscosity grade specified.				65-135 dmm for 120-150
	1990	#2	yes	Any certified PG binder can be used.	
	Solution: A work order must be prepared using Special Provision #1 (page 7). This will allow any PG binder to be substituted for the penetration or viscosity grade specified.				100-225 dmm for 200-250
<div>C A S E # 2</div>	1990	#3 / #4	no	The specified PG binder must be used	55-120 dmm for PG 58-28
	Solution: A work order must be prepared to Supersede Special Provision #3 (page 9) with Special Provision #5 (page 11). This work order must also supersede Special Provision #4 (page 10) with Special Provision #6 (page 12).				
	1990	#3 / #4	yes	Any PG binder can be used, as long as the cold temperature parameter is equal to or better than the specified PG grade.	70-180 dmm for PG 52-28
	Solution: A work order must be prepared to Supersede Special Provision #3 (page 9) with Special Provision #5 (page 11). This work order must also supersede Special Provision #4 (page 10) with Special Provision #6 (page 12).				
<div>C A S E # 3</div>	1996	#7	no	The specified PG binder must be used.	55-120dmm for PG 58-28
	Solution: A work order must be prepared to supersede Special Provision #7 (page 13) with Special Provision #8 (page 14).				
	1996	#7	yes	Any PG binder can be used, as long as the cold temperature parameter is equal to or better than the specified PG grade.	70-180 dmm for PG 52-28
	Solution: A work order must be prepared to supersede Special Provision #7 (page 13) with Special Provision #8 (page 14).				

¹If there are no Special Provisions in the proposal, the recovered penetration requirements in table 4.00-3 of the 1990 standard Specifications for construction must be met.

CASE #1:

Case #1 are projects that are governed by the 1990 Standard Specifications for Construction that have either of the following special provisions in their proposal:

- a. The Special Provision (#2) for Price Adjustments on Asphalt Cement (2-6-96) found on page 8 of this document.
- b. No special provision regarding price adjustments (recovered penetration requirements are as stated in the 1990 Specifications for Construction).

It is the contractors responsibility to select a PG grade binder that meets the recovered penetration requirements for the project.

Special Considerations for RAP Mixes:

The contractor must choose a certified PG binder that, in combination with the RAP, will meet the recovered penetration requirements of the project. (Refer to the Binder Requirements Table)

Solutions for Case #1:

In this case, the project engineer must use the Special Provision (#1) for Substituting Performance Grade Binder (7-25-97), found on page 7 of this document, to prepare a change order. This special provision allows ANY CERTIFIED PERFORMANCE GRADE (PG) BINDER to be substituted for the penetration grade specified in the plans.

A work order & recommendation must be prepared and a copy of the work order sent to the Bituminous Unit. A copy will also be given to the traveling mix inspector.

CASE #2

Case #2 are projects that are governed by the 1990 Standard Specifications for Construction that contain both the Special Provision (#3) for Performance Grade Binder (11-20-96), found on page 9 of this document, and the Special Provision (#4) for Price Adjustments on Asphalt Binders (2-24-97), found on page 10 of this document.

The Special Provision (#3) for Performance Grade Binder (11-20-96) requires that the penetration or viscosity grade specified in the plans be replaced by the corresponding PG binder. For example, if an 85-100 penetration grade is specified in the plans the contractor must use a PG 58-28 for the project.

The Special Provision (#4) for Price Adjustments on Asphalt Binders (2-24-97) give the recovered penetration requirements which correspond to the PG binders.

Currently, a PG binder is specified and the recovered binder must meet the recovered penetration requirements of the special provision.

Special Considerations for RAP Mixes:

Any PG binder can be used, as long as the cold temperature parameter for that binder is equal to or better than the specified PG grade. The contractor must choose a certified PG binder that, in combination with the RAP, will meet the recovered penetration requirements.

Solutions for Case#2:

Case #2 projects, which are in design and not yet under contract, will be modified in the following manner:

- The Special Provision (#3) for Performance Grade Binder (11-20-96) will be superseded by the Special Provision (#5) for Performance Grade Binder (7-23-97), found on page 11 of this document.
- The Special Provision (#4) for Price Adjustments on Asphalt Binders (2-24-97) will be superseded by the Special Provision (#6) for Price Adjustments on Asphalt Binder (7-25-97), found on page 12 of this document.

For projects already under contract, the Project Engineer is to prepare a work order and recommendation to supersede special provisions #3 and #4 which are currently in the contract and add special provisions #5 and #6. A copy of this work order should be sent to the Bituminous Unit and also given to the traveling mix inspector.

CASE #3

Case #3 are projects that are governed by the 1996 Standard Specifications for Construction, that contain the Special Provision (#7) for Price Adjustments on Asphalt Binders (2-24-97), found on page 13 of this document.

The specified performance grade binder will be found on the plan sheets. The specified PG binder will be used for the mixture. Currently, the recovered binder must meet the recovered penetration requirements of the Special Provision (#7) for Price Adjustments on Asphalt Binders (2-24-97).

Special Considerations for RAP Mixes:

Any PG binder can be used, as long as the cold temperature parameter is equal to or better than the specified grade. The contractor must choose a certified PG binder that, in combination with the RAP, will meet the recovered penetration requirements.

Solutions for Case #3:

Case #3 projects, which are in design and not yet under contract will be modified in the following manner:

- The Special Provision (#7) for Price Adjustments on Asphalt Binders (2-24-97) will be superseded by the Special Provision (#8) for Price Adjustments on Asphalt Binder (7-23-97) found on page 14 of this document.

For projects already under contract, the project engineer is to prepare a work order and recommendation to supersede special provision #7 which is currently in the contract and add special provision #8. A copy of this work order should be sent to the Bituminous Unit and also given to the traveling mix inspector.

MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

**SPECIAL PROVISION
FOR
SUBSTITUTING WITH PERFORMANCE
GRADE BINDERS**

C&T:JWB

1 of 1

07-25-97

C&T:APPR:EDW:MLL:7-28-97

a. Description.-The work shall be according to the 1990 Standard Specifications for Construction, except as modified below.

b. Materials.-Table 8.04-1 Penetration-Graded and Viscosity-Graded Asphalt Cements of the Michigan 1990 Standard Specifications for Construction is replaced by Table 1 Performance Graded Asphalt Binder Specification of ASTM D-4 Proposal P248.

Any references to 85-100 penetration grade or AC-10 viscosity grade in the scope of the work, will be substituted by any performance grade binder that meets the necessary recovered penetration requirements.

Any references to 120-150 penetration grade or AC-5 viscosity grade in the scope of the work, will be substituted by any performance grade binder that meets the necessary recovered penetration requirements.

Any reference to 200-250 penetration grade or AC-2.5 viscosity grade in the scope of the work, will be substituted by any performance grade binder that meets the necessary recovered penetration requirements.

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

**SPECIAL PROVISION
FOR
PRICE ADJUSTMENTS ON ASPHALT CEMENT**

M&T:JWB

1 of 1

02-06-96

C:APPR:EDW:MLL 2-9-96

Section 4.00.19 Price Adjustments: a. Asphalt Cement, in the Michigan 1990 Standard Specifications for Construction will be replaced as follows:

Price Adjustments:

- a. **Asphalt Cements.**-Samples of asphalt cement will be taken prior to incorporation into the mixture and from the bituminous mixture. Where results of tests on these samples deviate from specification requirements, the affected material will be subject to price adjustments on the following basis:
1. **Tests on Asphalt Taken Prior to Incorporation Into the Mixture.**-These samples will not be subject to price adjustment. They will be used to verify that the certified asphalt cement meets all specification requirements.
 2. **Tests on Asphalt Recovered from Bituminous Mixture.**-When the penetration results on recovered asphalt are found to fall within the ranges indicated in Table 4.00-3, the contract unit price for the mixture involved will be decreased by the percentages shown in the Table.

**Table 4.00-3
Price Adjustment for Bituminous Pavement Where Asphalt Recovered
from the Mixture is Deficient in Penetration Requirements**

Design Grade of Asphalt Cement	10% Decrease Penetration Above	25% Decrease Penetration Below	** Penetration Below
85-100	95 dmm	45 dmm	40 dmm
120-150	135 dmm	65 dmm	50 dmm
200-250	225 dmm	100 dmm	75 dmm

**The mixture produced will be evaluated by the Engineer and if in the Engineer's judgement the defective pavement warrants removal, the Contractor shall remove and replace the affected area at the Contractor's expense. If it is determined that the removal is not required, the contract unit price of the affected mixture will be reduced by 50 percent.

MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

SPECIAL PROVISION
FOR
PERFORMANCE GRADE BINDERS

M&T:JWB

1 of 1

11-20-96

CC:APPR:EDW:MLL 12-2-96

a. Description.-The work shall be according to the 1990 Standard Specifications for Construction, except as modified below.

b. Materials.-Table 8.04-1 Penetration-Graded and Viscosity-Graded Asphalt Cements of the Michigan 1990 Standard Specifications for Construction is replaced by Table 1 Performance Graded Asphalt Binder Specification of ASTM D-4 Proposal P248.

Any references to 85-100 penetration grade or AC-10 viscosity grade in the scope of the work, will be replaced by PG 58-28 binder.

Any references to 120-150 penetration grade or AC-5 viscosity grade in the scope of the work, will be replaced by PG 52-28 binder.

Any reference to 200-250 penetration grade or AC-2.5 viscosity grade in the scope of the work, will be replaced by PG 52-34 binder.

Special Provision #3 (Case #2)

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

**SPECIAL PROVISION
FOR
PRICE ADJUSTMENTS ON ASPHALT BINDER**

M&T:JWB

1 of 1

02-24-97

C:APPR:EDW:MLL 02-24-97

In the Michigan 1990 Standard Specifications for Construction in section 4.00.19- Measurement and Payment under the subsection "Price Adjustments:" delete subsection "2. Tests on Asphalt Recovered from Bituminous Mixtures.-" and replace with the following:

- 2. Asphalt Binders.**-Original samples of asphalt binder will be taken prior to incorporation into the mixture. The original samples will be used for Asphalt Binder Certification verification. Asphalt binder samples will also be recovered from the daily mixture sample.

Tests on Asphalt Recovered from Bituminous Mixture.-When the penetration results on recovered asphalt are found to fall within the ranges indicated in Table 501.04, the contract unit price for the mixture involved will be decreased by the percentages shown in the Table.

**Table 1
Price Adjustment for Bituminous Pavement Where Asphalt Recovered
from the Mixture is Deficient in Penetration Requirements**

Design Grade of Asphalt Cement	10% Decrease Penetration Above	25% Decrease Penetration Below	** Penetration Below
PG 58-28	115 dmm	55 dmm	45 dmm
PG 52-28	135 dmm	65 dmm	50 dmm
PG 52-34	180 dmm	80 dmm	60 dmm

**The mixture produced will be evaluated by the Engineer and if in the Engineer's judgement the defective pavement warrants removal, the Contractor shall remove and replace the affected area at the Contractor's expense. If it is determined that the removal is not required, the contract unit price of the affected mixture will be reduced by 50 percent.

CCL 1997-1
Page 11 of 14
August 6, 1997

Special Provision #4 (Case #2)

MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

SPECIAL PROVISION
FOR
PERFORMANCE GRADE BINDERS

C&T:JWB

1 of 1

07-23-97

C:APPR:EDW:JTL:7-23-97

a. Description.-The work shall be according to the 1990 Standard Specifications for Construction, except as modified below.

b. Materials.-Table 8.04-1 Penetration-Graded and Viscosity-Graded Asphalt Cements of the Michigan 1990 Standard Specifications for Construction is replaced by Table 1 Performance Graded Asphalt Binder Specification of ASTM D-4 Proposal P248.

Any references to 85-100 penetration grade, 120-150 penetration grade, AC-10 viscosity grade, or AC-5 viscosity grade in the scope of the work, will be replaced by PG 58-28 binder.

Any reference to 200-250 penetration grade or AC-2.5 viscosity grade in the scope of the work, will be replaced by PG 52-28 binder.

CCL 1997-1
Page 13 of 14
August 6, 1997

Special Provision #5 (Case #2)

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

**SPECIAL PROVISION
FOR
PRICE ADJUSTMENTS ON ASPHALT BINDER**

C&T:JWB

1 of 1

07-25-97

C&T:APPR:MLL:EDW:7-28-97

In the Michigan 1990 Standard Specifications for Construction in Subsection 4.00.19 Measurement and Payment under the Subsection "Price Adjustments: "delete a.1 and 2" and replace with the following:

Asphalt Binders.-Original samples of asphalt binder will be taken prior to incorporation into the mixture. The original samples will be used for Asphalt Binder certification verification. Asphalt binder samples will also be recovered from the daily mixture sample. Based on the results of penetration tests on this recovered asphalt binder, the contract unit price for the mixture will be adjusted as shown in Table 1.

**Table 1
Price Adjustment for Bituminous Pavement Where Asphalt Recovered
from the Mixture is Deficient in Penetration Requirements**

Design Grade of Asphalt Binder	10% Decrease	25% Decrease	**
	Penetration	Penetration	Penetration
PG 58-28	> 120 dmm	< 55 dmm	< 45 dmm
PG 52-28	> 180 dmm	< 70 dmm	< 50 dmm

**The mixture produced will be evaluated by the Engineer and if in the Engineer's judgement the defective pavement warrants removal, the Contractor shall remove and replace the affected area at the Contractor's expense. If it is determined that the removal is not required, the contract unit price of the affected mixture will be reduced by 50 percent.

CCL 1997-1
Page 15 of 14
August 6, 1997

Special Provision #6 (Case #2)

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

**SPECIAL PROVISION
FOR
PRICE ADJUSTMENTS ON ASPHALT BINDER**

M&T:DLC/GWE

1 of 1

02-24-97

C:APPR:EDW:JTL 02-24-97

Delete Subsection 501.04.A.2 AAsphalt Binders,@ in the Michigan 1996 Standard Specifications for Construction and replace with the following:

2. **Asphalt Binders.** Original samples of asphalt binder will be taken prior to incorporation into the mixture. The original samples will be used for Asphalt Binder Certification verification. Asphalt binder samples will also be recovered from the daily mixture sample.

Tests on Asphalt Recovered from Bituminous Mixture.-When the penetration results on recovered asphalt are found to fall within the ranges indicated in Table 501-5 (new table), the contract unit price for the mixture involved will be decreased by the percentages shown in the Table.

**Table 501-5
Price Adjustment for Bituminous Pavement Where Asphalt Recovered
from the Mixture is Deficient in Penetration Requirements**

Design Grade of Asphalt Cement	10% Decrease Penetration Above	25% Decrease Penetration Below	** Penetration Below
PG 58-28	115 dmm	55 dmm	45 dmm
PG 52-28	135 dmm	65 dmm	50 dmm
PG 52-34	180 dmm	80 dmm	60 dmm

** The mixture produced will be evaluated by the Engineer and if in the Engineer's judgement the defective pavement warrants removal, the Contractor shall remove and replace the affected area at the Contractor's expense. If it is determined that the removal is not required, the contract unit price of the affected mixture will be reduced by 50 percent.

STATE OF MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS

**SPECIAL PROVISION
FOR
PRICE ADJUSTMENTS ON ASPHALT BINDER**

C&T:JWB

1 of 1

07-23-97

C:APPR:EDW:JTL:7-23-97

When the specified performance grade of asphalt binder is PG 58-28 or PG 52-28 then delete Subsection 501.04.A.2. Asphalt Binder, in the Michigan 1996 Standard Specifications for Construction and replace with the following:

2. **Asphalt Binders.**-Original samples of asphalt binder will be taken prior to incorporation into the mixture. The original samples will be used for Asphalt Binder Certification verification. Asphalt binder samples will also be recovered from the daily mixture sample.

Tests on Asphalt Recovered from Bituminous Mixture.-When the penetration results on recovered asphalt are found to fall within the ranges indicated in Table 501.04, the contract unit price for the mixture involved will be decreased by the percentages shown in the Table.

**Table 501.04
Price Adjustment for Bituminous Pavement Where Asphalt Recovered
from the Mixture is Deficient in Penetration Requirements**

Design Grade of Asphalt Binder	10% Decrease Penetration Above	25% Decrease Penetration Below	** Penetration Below
PG 58-28	120 dmm	55 dmm	45 dmm
PG 52-28	180 dmm	70 dmm	50 dmm

**The mixture produced will be evaluated by the Engineer and if in the Engineer's judgement the defective pavement warrants removal, the Contractor shall remove and replace the affected area at the Contractor's expense. If it is determined that the removal is not required, the contract unit price of the affected mixture will be reduced by 50 percent.